fifteen sulphides studied by him (those of mercury, zinc, tungsten, molybdenc, indium, platinum, gold, palladium, silver, thallium, lead, bismuth, iron, nickel, and cobalt) have been obtained in the colloidal state. They bring up to thirty-one the number of colloids now known to science. Some have been prepared by Graham's method, others directly by treating the oxides suspended in the water with hydrosulphuric acid.—On the pretended pro-atlas of mammals and *Hatteria punctata*, by Jules Cornet. The bony process between the occipital and the atlas known as the pro-atlas or proto-vertebra, and found in crocodiles and some other reptiles, is here shown not to exist in the mammals as supposed by some naturalists. The view of Smets regarding its absence from Hatteria is also confirmed.—On the process employed by the fresh-water Gasteropods for crawling over the liquid surface, by Victor Willem. This process is shown to be somewhat analogous to that of snails moving on dry land, being effected by secreting a mucus which enables the mollusk to adhere to the surface.—Researches on the volatility of the carbon compounds; chloro-oxygenated compounds, by Louis Henry. The object of these researches is to examine, in reference to their volatility, the compounds in which chlorine and oxygen are simultaneously combined with carbon. The subject is discussed under three heads: (1) the compounds comprising the system $>\mathrm{C}-\mathrm{O}$; (2) the system $\rightarrow\mathrm{C}-\mathrm{OX}$; (3) the mixed derivatives simultaneously including both these systems.

Rendiconti del Reale Istituto Lombardo, March 22.—Observations made in the Brera Observatory, Milan, during the total lunar eclipse of January 28, 1888, by G. V. Schiaparelli. These observations were made under favourable conditions in accordance with the instructions issued by the Pulkova astronomers, with the ultimate view of determining more accurately than has yet been possible the exact length of the diameter of the moon. In the accompanying tables are given the results of the observations, comprising the comparison-stars with their magnitudes and numbers as in the catalogue distributed by the Pulkova astronomers.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, March 22.—"The Chemical Composition of Pearls." By George Harley, M.D., F.R.S., and Harald S. Harley.

(1) As regards oyster pearls. Of these, three varieties were examined—British, Australian, and Ceylonese.

The qualitative analyses showed that they all had an identical composition, and that they consisted solely of water, organic matter, and calcium carbonate. There was a total absence of magnesia and of all the other mineral ingredients of sea-water—from which the inorganic part of pearls must of course be obtained. Seeing that ordinary sea-water contains close upon ten and a half times more calcium sulphate than calcium carbonate, one might have expected that at least some sulphates would have been found along with the carbonates, more especially if they are the mere fortuitous concretions some persons imagine them to be; a view the authors cannot indorse, from the fact that by steeping pearls in a weak aqueous solution of nitric acid, they are able to completely remove from them all their mineral constituents without in any way altering their shape, and but very slightly changing their naked eye appearances, so long as they are permitted to remain in the solution. When taken out they rapidly dry and shrivel up. Dr. George Harley will take occasion to point out in his next communication, which will be on the microscopic structure of pearls, that a decalcified crystalline pearl bears an intimate resemblance to a decalcified bone, in so far as it possesses a perfectly organized matrix of animal matter. No phosphates whatever were found in any of the three before-named varieties of pearls.

The next point being to ascertain the exact proportions of the substances composing the pearls, and pure white pearls being expensive, from having ascertained that all the three kinds they were operating upon had exactly the same chemical composition, instead of making separate quantitative analyses of them, they simply selected two pearls from each variety, of as nearly the same size and weight—giving a total of 16 grains—and analyzed them collectively, the result obtained being: carbonate of lime 91·72 per cent; organic matter (animal), 5·94 per cent; water 2·23 per cent.

(2) Composition of cocoa-nut pearls.

A portion of a garden pea sized cocoa-nut pearl, weighing 14 grains, was subjected to analysis, and found that, like shell-fish pearls it consisted of carbonate of lime, organic matter (animal), and water.

It had all the external appearances of the pearls found in the large clams (*Tridacna gigas*) of the Southern Ocean, being perfectly globular, with a smooth, glistening, dull white surface, and resembling them exactly in microscopic structure. Besides which in chemical composition it bore no similarity to cocoa-nut milk, to which it is supposed to be related; for cocoa-nut milk is said to contain both the phosphate and the malate, but not the carbonate of lime. That there are pearls found in cocoa-nuts the authors do not presume to deny; all they mean to say is that they are doubtful if the specimen examined had such an origin.

(3) As regards mammalian pearls.

These so-called pearls have been met with in human beings and in oxen.

In so far as naked-eye appearances are concerned, a good specimen of the variety of pearl now spoken of is quite undistinguishable from a fine specimen of Oriental oyster pearl, from its not only being globular in shape, and of a pure white colour, but from its also possessing the iridescent sheen so characteristic of Oriental oyster pearls of fine quality.

In chemical composition, however, mammalian pearls bear no similarity whatever to pearls found in shell-fish, for they are composed of an organic instead of an inorganic material—namely, cholesterin. In microscopic structure again, they bear a marked resemblance to the crystalline variety of shell-fish pearls.

April 19.—"On Hamilton's Numbers. Part II." By J. J. Sylvester, D.C.L., F.R.S., Savilian Professor of Geometry in the University of Oxford, and James Hammond, M.A. Cantab.

§ 4. *Continuation, to an infinite Number of Terms, of the Asymptotic Development for Hypothenusal Numbers.*

In the third section of this paper (Phil. Trans. A., vol. clxxviii. p. 311) it was stated, on what is now seen to be insufficient evidence, that the asymptotic development of $p - q$, the half of any hypothenusal number, could be expressed as a series of powers of $q - r$, the half of its antecedent, in which the indices followed the sequence $2, \frac{3}{2}, 1, \frac{3}{4}, \frac{5}{8}, \frac{1}{2}, \ldots$

It was there shown that, when quantities of an order of magnitude inferior to that of $(q - r)^{\frac{3}{4}}$ are neglected,

$$p - q = (q - r)^2 + \tfrac{4}{3}(q - r)^{\frac{3}{2}} + \tfrac{11}{18}(q - r) + \tfrac{10}{81}(q - r)^{\frac{3}{4}};$$

but, on attempting to carry this development further, it was found that, though the next term came out $\frac{88}{1215}(q - r)^{\frac{5}{8}}$, there was an infinite series of terms interposed between this one and $(q - r)^{\frac{1}{2}}$.

In the present section it will be proved that between $(q - r)^{\frac{3}{4}}$ and $(q - r)^{\frac{1}{2}}$ there lies an infinite series of terms whose indices are—

$$\tfrac{5}{8}, \tfrac{9}{16}, \tfrac{17}{32}, \tfrac{33}{64}, \tfrac{65}{128}, \ldots$$

and whose coefficients form a geometrical series of which the first term is $\frac{88}{1215}$ and the common ratio $\frac{2}{3}$.

We shall assume the law of the indices (which, it may be remarked, is identical with that given in the introduction to this paper as originally printed in the *Proceedings* but subsequently altered in the Transactions), and write—

$$\begin{aligned} p - q = {} & (q - r)^2 + \tfrac{4}{3}(q - r)^{\frac{3}{2}} + \tfrac{11}{18}(q - r) + \tfrac{10}{81}(q - r)^{\frac{3}{4}} \\ & + \frac{2^3}{3^3}\mathrm{A}(q - r)^{\frac{5}{8}} + \frac{2^4}{3^4}\mathrm{B}(q - r)^{\frac{9}{16}} + \frac{2^5}{3^5}\mathrm{C}(q - r)^{\frac{17}{32}} \\ & + \frac{2^6}{3^6}\mathrm{D}(q - r)^{\frac{33}{64}} + \frac{2^7}{3^7}\mathrm{E}(q - r)^{\frac{65}{128}} + \&\text{c.}, \textit{ ad inf.} \quad . \quad . \; (1) \\ & + \Theta^{*} \end{aligned}$$

The law of the coefficients will then be established by proving that—

$$\mathrm{A} = \mathrm{B} = \mathrm{C} = \mathrm{D} = \mathrm{E} = \ldots\ldots = \tfrac{11}{45}.$$

If there were any terms of an order superior to that of $(q - r)^{\frac{1}{2}}$, whose indices did not obey the assumed law, any such term would make its presence felt in the course of the work; for, in the process we shall employ, the coefficient of each term has to be determined before that of any subsequent term can be found. It was in this way that the existence of terms between

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* In the text above, Θ represents some unknown function, the asymptotic value of whose ratio to $(q - r)^{\frac{1}{2}}$ is not infinite.

$(q - r)^{\frac{5}{8}}$ and $(q - r)^{\frac{1}{2}}$ was made manifest in the unsuccessful attempt to calculate the coefficient of $(q - r)^{\frac{1}{2}}$.

It thus appears that the assumed law of the indices is the true one.

It will be remembered that $p, q, r, \ldots$ are the halves of the sharpened Hamiltonian Numbers $E_n + 1$, E_n, $E_n - 1$, ... and that consequently the relation—

$$E_{n+1} = 1 + \frac{E_n(E_n - 1)}{1 \,.\, 2} - \frac{E_{n+1}(E_{n-1} - 1)(E_{n-1} - 2)}{1 \,..\, 2 \,...\, 3} + \ldots$$

may be written in the form—

$$p = \tfrac{1}{2} + \frac{q(2q-1)}{2} - \frac{r(2r-1)(2r-2)}{2 \,.\, 3} + \frac{s(2s-1)(2s-2)(2s-3)}{2 \,.\, 3 \,..\, 4}$$
$$- \frac{t(2t-1)(2t-2)(2t-3)(2t-4)}{2 \,.\, 3 \,...\, 4 \,..\, 5}$$
$$+ \frac{u(2u-1)(2u-2)(2u-3)(2u-4)(2u-5)}{2 \,...\, 3 \,.\, 4 \,.\, 5 \,...\, 6}$$
$$- \ldots \qquad (2)$$

The comparison of this value of p with that given by (1) furnishes an equation which, after several reductions have been made in which special attention must be paid to the order of the quantities under consideration, ultimately leads to the determination of the values of A, B, C, ... in succession.

Physical Society, April 14.—Shelford Bidwell, F.R.S., Vice-President, in the chair.—Mr. W. E. Sumpner read a paper on the variation of the coefficients of induction. The author pointed out that there are three ways of defining the coefficient of self-induction of a circuit, expressed by the following equations—

$$(1)\quad e = L_1 \frac{dC}{dt}\,; \qquad (2)\quad N = L_2 C\,;$$
$$(3)\quad T = \tfrac{1}{2} L_3 C^2\,;$$

where e = back E.M.F. due to change of current, C = current, N = total induction through the circuit, and T the kinetic energy of the circuit. If the medium be air, L_1, L_2, and L_3 are identical, but in the case of iron this is no longer the case. When the curve of magnetization is given, their values, corresponding with any value of C, can be easily determined by the above equations. Maxwell's absolute method of measuring self-induction gives L_2, and by a modification due to Prof. Ayrton, where the current is altered from C_1 to C_2 instead of from 0 to $C = \frac{C_1 + C_2}{2}$, the value of L obtained is approximately L_1, if $C_1 - C_2$ is small compared with C. From the known character of the curves of magnetization of iron, it is easily seen that the value of L_2 increases with the current when the current is small, then becomes nearly constant, and afterwards decreases. For an electro-magnet having a horse-shoe core of best Swedish iron ½″ diameter and 14″ long, wound with 800 convolutions, the value of L_2 for currents between ·047 and ·107 amp. was found to satisfy the equation $L_2 = \frac{A}{5} + {·}0425$, where A = current in amperes. A method of comparing self-induction with capacity is described, in which the arm of a Wheatstone's bridge opposite the one containing self-induction is shunted by a condenser of capacity K. The bridge is balanced for steady currents, and the deflection, θ_1, of the galvanometer observed on breaking the battery circuit. θ_1 is :: $L_2 - Kps$, where p and s are the resistances of the two remaining arms of the bridge. The condenser is then disconnected, and another swing, θ_2, obtained, on again breaking the battery circuit. θ_2 is :: L_2,

$$\therefore\ \frac{\theta_2}{\theta_1} = \frac{L_2}{L_2 - Kps}\,, \text{ or } L_2 = \frac{\theta_2}{\theta_2 - \theta_1} Kps.$$

Further experiments were made on the electro-magnet when its poles were joined by a piece of soft iron, the currents being reversed. The resulting values of L_2, $\mathfrak{B}$, $\mathfrak{H}$, and μ are given in absolute measure, and from them the author deduces—

$$L_2 = {·}05 + 3{·}9\,A, \qquad \mu = 210 + 720\,\mathfrak{H},$$
$$\mathfrak{B} = 210\,\mathfrak{H} + 720\,\mathfrak{H}^2, \text{ for values of A between ·06 and ·9.}$$

The difficulties experienced in determining the induction coefficients for strong magnetizing forces produced by the testing current are described. They arise chiefly from the fact that in order to obtain strong currents, the resistances must be small. This makes the "*time constant*" large, and in order to obtain the values of L in absolute measure, a ballistic galvanometer of very long period would be required. A method of calibrating a galvanometer of comparatively short period to give approximate results is described. Where the magnetizing force is produced by an independent coil, no such difficulties present themselves. Results obtained for the coefficients of self-induction of a gramme armature (A type) for different currents round the field magnets vary from ·0218 for current 0 to ·0117 for a current of 29 amperes. The value of L for a given point on the curve of magnetization is not a definite quantity, but has always two or more distinct values, depending on whether the magnetization is increased or decreased by the test currents, and on the previous history of the iron. That this must be the case is easily seen from the curves obtained by Prof. Ewing in his "Experimental Researches on Magnetism." The values of L corresponding to the three sides of a small Ewing's cycle are denoted by L_p (*progressive coefficient*), L_r (*return coefficient*) and L_c (*cyclic coefficient*). L_p is always the largest, whether the magnetization be increased or decreased by the testing current. Numerical values of L_p and L_c obtained from a Kapp and Snell transformer are given. L_c can be very accurately determined by Profs. Ayrton and Perry's secohmmeter, and some of the results given in the paper were thus obtained. Having given the curve of magnetization and that connecting impressed E.M.F. and time, a simple graphical method is described for drawing the current curve. Applying this to an alternating current where the E.M.F. is a pure sine function of the time, it is shown that the resulting current curve differs considerably from a sine curve. The case of the rise of current in the magnet coils of a dynamo excited by accumulators is also discussed, the derived curves being in accordance with observation. In conclusion the author pointed out that the time taken to discharge a condenser through a given resistance may be decreased by adding self-induction to the circuit, provided L is less than $\frac{1}{2}KR^2$. When $L = \frac{1}{4}KR^2$, the discharge is completed in one-half the time required when L = 0. This may account for the remarkable results observed by Dr. Lodge in his experiments on iron and copper as lightning-conductors.—Mr. C. V. Boys described and performed some experiments on soap-bubbles, and by their aid demonstrated in a remarkable manner the phenomena of surface tension, diffusion, and the magnetic properties of gases. By blowing one bubble inside another, he showed that there is no electrical force inside a closed conductor. A peculiar property of soap-bubbles is their refusal to come into contact when knocked against each other; they may receive violent shocks and still remain separate. If, however, an electrified body be brought in the vicinity, they immediately coalesce. So sensitive are they to electrical attraction that a potential difference due to one Leclanché cell between the two bubbles causes them to unite. They may thus serve as very delicate electroscopes. Many other beautiful and extremely interesting experiments on liquid films of different shapes were performed in a masterly manner.

Geological Society, April 11.—W. T. Blanford, F.R.S., President, in the chair.—The following communications were read:—On the lower beds of the Upper Cretaceous series in Lincolnshire and Yorkshire, by W. Hill.—On the Cae Gwyn Cave, North Wales, by Dr. Henry Hicks, F.R.S.; with an appendix by C. E. De Rance. The author gave an account of the exploration of the cavern during the latter part of 1885, and during 1886–87. He considered that the results obtained during that time proved conclusively that there was no foundation for the views of those who contended that the drift which covered over the entrance and extended into the cavern was *remanié*, but they proved that the deposits which lay over the bone-earth were *in situ*, and were identical with the normal glacial deposits of the area. These deposits had once extended continuously across the valley, and the cavern (400 feet above Ordnance datum) had consequently been completely buried beneath them. The cave must have been occupied by animals during the formation of the bone-earth, before any of the glacial deposits now found there had accumulated, and a thick floor of stalagmite had covered this "earth" before the cavern had been subjected to water-action. This action had broken up the floor, and completely re-sorted the materials, and added sandy and gravelly material to the deposits; this sand and gravel had been examined by Prof. Boyd Dawkins, who found that it agreed in every particular with the glacial sand

and gravel occurring in the valley a little way above. The large limestone blocks in the cavern had also been evidently disturbed by water-action; they were invariably found in the lowest deposits, and were covered over by laminated clay, sand, and gravels. The author considered it certain that the caverns had been completely filled with these materials, and in the case of the Cae Gwyn Cave they appeared to have been conveyed mainly through the entrance recently discovered under the drift. The stratification at this entrance was so marked, and could be traced so continuously inwards over the bone-earth, that there could be no doubt that this was the main entrance. There was not the slightest evidence that any portion of the material had been conveyed in through a swallow-hole, and the conditions witnessed throughout were such as to preclude any such idea. The author quoted a Report by Dr. Geikie, who considered that the wall of the cavern had given way, but before the deposition of the glacial deposits, which were subsequently laid down against the limestone bank so as to conceal this entrance to the cavern. In conclusion, he referred to the presence of reindeer remains in these caves, in conjunction with those of the so called older Pleistocene Mammalia, proving that these had reached the area long before the period of submergence, and evidently at an early stage in the Glacial period. It was important to remember that reindeer remains had been found in the oldest river-gravels in which implements had been discovered. Man, as proved by the implements discovered, was also present at the same time with the reindeer, and it was therefore natural to suppose that he migrated into this area in company with that animal from some northern source, though this did not preclude the idea that he might also have reached this country from some eastern or southern source, perhaps even at an earlier period. In the course of the discussion which followed the reading of this paper, Dr. Evans said the archæological evidence was against Dr. Hicks's views.

Chemical Society, April 19.—Mr. W. Crookes, F R.S., in the chair.—The following papers were read:—The influence of temperature on the composition and solubility of hydrated calcium sulphate and of calcium hydroxide, by Messrs. W. A. Shenstone and J. T. Cundall. The authors find, contrary to the usual statements on the subject, that hydrated calcium sulphate, whether of natural or of artificial origin, parts with a portion of its water at moderate temperatures, *e.g.* 40° C., and that it may be almost completely dehydrated in dry air at temperatures below 100° C. The effect of heat in diminishing the solubility of calcium sulphate in water at temperatures between 40° and 150° may therefore be possibly due to the unequal solubility of the hydrated and anhydrous salts. Calcium hydroxide is likewise less soluble in hot than in cold water, but the authors have failed to obtain evidence in favour of the view that the diminished solubility in this case may depend upon the dissociation of the hydroxide or of some hydrate of the hydroxide.—Thermo-chemical constants, by Mr. S. U. Pickering. In a criticism of several deductions drawn by Thomsen from thermo-chemical data, the author refers to the supposed "common constant of affinity"—a quantity whose multiples by numbers up to 10 are supposed to represent various reactions, some of which are similar, and others totally dissimilar (*Ber. Deutsch. Chem. Ges.*, v. 170, vi. 239); and points out that any number taken at random, *e.g.* 15,000 cal., would have given results similar to those obtained by employing Thomsen's value of the constant, viz. 18,361 cal.—Action of hot copper on the mixed vapours of phenol and carbon bisulphide, by Prof. T. Carnelly and Mr. J. Dunn. A small yield of a new diphenylene ketone (m.p. = 83°) is obtained in this reaction.—Oxidation of oxalic acid by potassium bichromate, by Mr. E. A. Werner.—The action of phenylhydrazine on urea and on some of its derivatives, by Mr. S. Skinner and Dr. S. Ruhemann.—Derivatives of phenylisobutyric acid, by Dr. L. Edeleanu.—The logarithmic law of atomic weights, by Mr. G. J. Stoney, F.R.S.

Zoological Society, April 17.—Dr. St. George Mivart, F.R.S., Vice-President, in the chair.—The Secretary read a report on the additions that had been made to the Society's Menagerie during the month of March 1888.—Mr. C. Stewart exhibited a preparation showing the structure and development of the brood-pouch of a Marsupial Tree-Frog (*Nototrema marsupiatum*).—Mr. Boulenger exhibited and made remarks on the type specimen of a new species of Marsupial Tree-Frog (*Nototrema fissipes*) recently discovered by Mr. G. A. Ramage near Pernambuco, in Brazil.—Mr. Herbert Druce read the descriptions of some new species of Heterocera collected by Mr. C. M. Woodford at Suva, Viti Levu, Fiji Islands. The collection had been made during the months of February, March, and April, 1886, and was especially interesting on account of the exact localities being noted, as well as for the new species it contained. Ninety-four species were represented, eight of which were described by the author as new to science.—A communication was read from Mr. T. D. A. Cockerell, containing some remarks on atavism, with reference to a paper on the same subject read by Mr. J. Bland Sutton at a previous meeting of the Society.—Prof. G. B. Howes gave an account of the vocal pouch of *Rhinoderma darwini*, and described in detail the mode of its attachment and the position of the embryos in it. The author controverted the idea of Espada that the alimentary functions were arrested during the development of the embryos in this Batrachian.—Mr. Oldfield Thomas read a paper describing a new genus and species of Muridæ obtained by Mr. H. O. Forbes during his recent expedition to New Guinea. The author proposed to call this form, which was characterized by the possession of a prehensile tail, *Chiruromys forbesi*, after its discoverer.—Lieut. Colonel Godwin-Austen, F.R.S., read the first of a proposed series of papers on the Land-Mollusca of Burma. The present communication gave an account of the shells collected by Capt. Spratt, R.A., in Upper Burma, among which were specimens of several new and very interesting species. A communication was read from Mr. R. Bowdler Sharpe, containing the sixth of his series of notes on the specimens of the Hume collection of birds. The present paper treated of some of the species of the genus *Digenea*.

Anthropological Institute, April 24.—Francis Galton, F.R.S., President, in the chair.—A paper by Dr. Venn on recent anthropometry at Cambridge was read, and was followed by a communication by the President on the head-growth of Cambridge students. The President's paper we print elsewhere. Mr. Galton also read a paper on the answers he had received from teachers in reply to questions respecting mental fatigue.

PARIS.

Academy of Sciences, April 23.—M. Janssen, President, in the chair.—Influence of gravity on the co-ordinates measured by means of equatorials, by MM. Lœwy and P. Puiseux. The paper deals mainly with the equatorials *coudés*, such as the large instrument intended for the Paris Observatory, and gives the general formulas of reduction.—On the aperiodic regulation of the amortisement and of the phase in a system of synchronized oscillations, by M. A. Cornu. The principle is explained of this aperiodic method of control, which is shown to possess several advantages over the systems at present in use. It reduces to a minimum, if not to zero, the influence of the more ordinary disturbing causes, and supplies a continuous check for the regulating apparatus as well as a simple means of readjustment should it get out of order.—Remarks on M. Stoletow's recent communication on a class of electric currents set up by the ultra-violet rays, by M. Edm. Becquerel. The note referred to the passage of an electric current between two disks, or metallic conductors, placed parallel to, and at a little distance from, each other, by means of the layer of intervening air, which requires to be more or less heated by the radiation of a voltaic arc. M. Becquerel points out that these effects appear to be analogous to those which he observed and analyzed in a different way in the year 1853. He then showed that heated gases may conduct electric currents, these effects being functions of the nature and density of the gases, as well as of the relative dimensions of the electrodes.—On the fixation of nitrogen by vegetable soil, by M. Berthelot. This is a reply to M. Schlœsing's recent remarks, the main object of the note being to more clearly establish the history of these researches and their present character.—On the optical properties of natural pharmacolite, by M. Des Cloizeaux. The author, having recently resumed his interrupted studies of this crystal, finds that its optical crystallographic properties are absolutely identical with those of the artificial crystals lately obtained by M. Dufet. The only difference is an excess of about 4 per cent. of water as determined by previous analyses of the natural crystals. But these crystals are hygrometric, and lose some of their water at 100° C. The specimens analyzed were also probably mixed with a little wapplerite, which has yielded as much as 29 per cent. of water, and which in the state of an efflorescent powder is usually associated with pharmacolite.—Note on the optical characters of haidingerite, by M. Des Cloizeaux. An examination of some small specimens of this extremely rare crystal found in association with a few fragments of pharmacolite shows that it must be grouped with the family of the positive acute bisector crystals. One of its indices of refraction, formerly measured by Haidinger on a natural prism of 40°, formed by two opposite facets, *h'* and *m*, must be the maximum index, $\alpha = 1{\cdot}67$.—Observations of Palisa's new planets 275 and 276, made at the Observatory of Algiers, by MM. Trépied, Rambaud, and Sy. These observations, which were made with the 0·50 m. telescope, cover the period April 17–18, when the two planets were of the respective estimated magnitudes 11 and 11·5.—On the employment of gas thermometers, by M. Crafts. These remarks are made in connection with the hydrogen instrument recently described by M. Cailletet, who mentions an analogous type of thermometer devised ten years ago by M. Crafts.—On a new system of telephonic communication between trains in motion and the neighbouring stations, by M. P. Germain. A series of electric measurements effected on rails from the stand-point of their resistance, insulation, and diffusive electric power, has satisfied the author that the two metallic parts of the same line connected together constitute an excellent conductor, provided the circuit and pile be insulated from earth. He has established curves of resistance for the rails according to the variations caused by the temperature and by the humid condition of the ballast. A new line shows less resistance than an old, owing to the oxidation of the points and the slow transformation brought about in the molecules of steel under the influence of vibration. By setting up the necessary apparatus in the stations and in the guard's van, telephonic correspondence may be carried on in both directions; but the details of the process are for the present withheld.—On a new fossil fish of the Commentry (Allier) Coal-measures, by M. Charles Brongniart. This fish, of which several good specimens have been found, presents peculiarities distinguishing it from all other fishes extinct or living. It is here consequently constituted a separate order of Pleuracanthides, as the prototype of the star-fish, Ceratodus, and allied forms. The present specimen is named *P. gaudryi*, in honour of M. Albert Gaudry.

BERLIN.

Physiological Society, April 13.—Prof. Munk, President, in the chair.—Prof. Gad made a complementary communication to his previous one dealing with the proof of the Wallerian law. His experiments were carried out, in conjunction with Dr. Joseph, on the vagus nerve and its jugular ganglion. The nerve was cut through either on the central or peripheral side of the ganglion, and after six or eight weeks degeneration was looked for in the ganglion and nerve. These experiments yielded only a general confirmation of Waller's law; at the same time they brought to light so many peculiarities and divergencies, that, even with the help of physiological experiment, it was found impossible to deduce any universal laws from the details communicated to the Society.—Dr. Baginski spoke on the Bacteria normally present in the fæces of children which are being fed on the milk of the mother. As is well known, Eschricht has distinguished two kinds among the above, viz. *Bacterium lactis* and *Bacterium coli*; of these the first is said to be capable of inducing the lactic fermentation of milk-sugar. The speaker had investigated the truth of this statement by cultivating the *Bacterium lactis*, with all needful precautions, in a solution of milk-sugar to which neither peptone nor any other nutrient fluid had been added. When the fermentation was at an end, the fluid was strongly acid, but no lactic acid, or at most the minutest trace of this acid, could be discovered in it: all the reactions which it did yield pointed to the presence in it of acetic acid. This *Bacterium lactis* (which should now rather perhaps be called *Bacterium aceti*) produced no effect on casein or any other proteid, and no putrefactive change was induced. Similarly it had no action on starch paste. Bearing in mind the practical medical interest which attaches to fermentative processes which may occur in the alimentary canal of children at the breast, Dr. Baginski had next investigated the behaviour of the Bacterium and the nature of the fermentation it produces when deprived of air and oxygen, and found that the fermentation was in all respects the same as that which takes place with access of air. The gaseous products of the fermentation were carbonic acid gas, hydrogen and marsh-gas. From among the various substances whose action on the Bacterium was tried, it is sufficient to mention that acetic acid very speedily killed it, so that no growth of the organism was observed in gelatine made acid with the product of its own activity. This product therefore plays the part of an active poison as regards the further life of the organism.—Dr. Mertsching spoke on the histology of the skin and hairs, and in some detail on the mode of origin of horny growths. The speaker exhibited a large number of preparations in support of his views.

AMSTERDAM.

Royal Academy of Sciences, March 31.—Mr. Martin stated that he had been charged by Mr. van Lansberge, late Governor-General of Dutch India, to present to the Leyden Museum a portion of a jaw of a gigantic Ichthyosaurus from the south coast of Ceram. From this fossil the existence of Mesozoic strata in that island may be inferred; and the fact that in British India and in Australia remains of the same animal have been found in the Chalk suggests that in Ceram also there may be a Cretaceous formation. The statement made in Berghaus's Physikalischer Atlas, to the effect that a Palæozoic formation is to be found on the south coast of Ceram, is without foundation.

BOOKS, PAMPHLETS, and SERIALS RECEIVED FOR REVIEW.

The Australian Race, 4 vols.: E. M. Curr (Trübner).—Abhandlungen und Berichte des K. Zoologischen und Anthropologisch-Ethnographischen Museums zu Dresden: Dr. A. B. Meyer (Friedländer).—Diamagnetism and Magne-Crystallic Action; New Edition: John Tyndall (Longmans).—Silkworms: E. A. Butler (Sonnenschein).—A Treatise on Hydrodynamics, vol. i.: A. B. Basset (Deighton, Bell, and Co.).—Publications of the Lick Observatory of the University of California, vol. i., 1887 (Sacramento).—Methodik der Gesamten Naturwissenschaft: K. Kollbach (Leipzig).—Turbans and Tails: A. J. Bamford (Low).—Antipodean Notes: Wanderer (Low).—Lights and Shadows of Melbourne Life: J. Freeman (Low).—The Land of the Pink Pearl: L. D. Powles (Low).—The Birds of Dorsetshire: J. C. Mansel Pleydell (Porter).—Argentine Ornithology; A Descriptive Catalogue of the Birds of the Argentine Republic, vol. i.: P. L. Sclater and W. H. Hudson (Porter).—Dr. H. G. Bronn's Klassen und Ordnungen des Thier-Reichs; Erster Band, Protozoa: Dr. O. Bütschli (Williams and Norgate).—Mémoire sur la Théorie de la Figure des Planètes: M. O. Callandreau.—Bulletin de l'Académie Royale des Sciences de Belgique, No. 3, 1888 (Bruxelles).—Transactions of the New York Academy of Sciences, vol. vi. (New York).

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